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Agricultural Memorandum No 420

Barley mildew spores - effect of incubation period

L P SMITH

Ag Mem 419 assessed the spore potential on any one day by reference to the number already released but if the probable incubation period is taken into account, it is more logical to refer to the number released 5, 6, 7 and 10 days or more previously. This procedure implies the (unjustified) assumption that previous infection conditions existed in proportion to previous spore release, but there is no alternative at this stage.

Examination of the data suggested that if the previous release (as defined above) ranged from 0-7000 the mean release on the day concerned varied by about 150 per 1000, with little increase above an average of about 1100 per day.

The following correction factors were therefore chosen to adjust for pollen potential:-

Pollen:-	0	500	1000	1500	2000	2500	3000	
Factor:-	16	4.6	2.7	1.9	1.5	1.2	1.0	
Pollen:-	3500	4000	4500	5000	5500	6000	6500	7000
Factor:-	0.86	0.76	0.68	0.62	0.56	0.52	0.48	0.45

with suitable interpolations and a minimum of 0.43.

Effect of temperature

Using the same temperature criterion as in Ag Mem 419, namely the sum of the air maxima of the day in question and the day previous, it was found:-

Range of summed maxima	Mean adjusted catch	
23 - 27	213	
24 - 28	238	
25 - 29	241	These figures
26 - 30	301	suggest a
27 - 31	309	decrease of 30
28 - 32	349	for each degree
29 - 33	414	below 35 and
30 - 34	427	an increase of
31 - 35	448	100 for each
32 - 36	450	degree above.
33 - 37	508	
34 - 38	574	
35 - 39	709	
36 - 40	734	
37 - 41	853	
38 - 42	1106	

Effect of wind

If the daily catch is now adjusted for spore potential and for temperature (to a standard of 35) and analysed with respect to run-of-wind (24 hour totals) it is found:-

Range of run-of-wind	Mean adjusted catch	
50 - 100	330	
60 - 110	340	
70 - 120	410	
80 - 130	420	
90 - 140	475	These figures
100 - 150	520	suggest a
110 - 160	530	decrease of 15
120 - 170	435	per 10 miles/day
130 - 180	487	below 220 and
140 - 190	500	an increase of
150 - 200	457	300 per 10 miles
160 - 210	515	per day above.
170 - 220	600	
180 - 230	580	
190 - 240	540	
200 - 250	530	
210 - 260	850	
220 - 270	1340	
230 - 280	1725	
240 - 290	1750	

Effect of sunshine

With these adjustments no further improvement can be found by use of sunshine data.

Estimation model

Starting with 565 and successively adjusting for temperature and run-of-wind, then using the spore potential factor, daily estimates can be made. The results are shown in detail in the Appendix, which also contains rainfall data: rain total appears to have little effect on the daily catch.

The results are similar, at times slightly better than those quoted in Ag Mem 419. In particular the estimates on the pairs of days with high pustule counts are better.

Dates	Pustule Count	Actual Spore Count	Estimated Spore Count
June 3 & 4	11.7	1518	1900
2 & 3	8.1	2013	2150
1 & 2	6.9	1241	1240
23 & 24	6.6	3283	3590
4 & 5	5.1	772	750

Any comment or criticism on this memorandum should be referred to the Author.

Meteorological Office
Bracknell, Berks
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Appendix

Site: 1971 Harpenden

Date MAY	Maximum Temperatures	Corr	Run of Wind	Corr	Corrections +565	Previous Release	Spore Factor	Estimate	Actual		Rain mm
11	41	+600	71	-223	943	(40)	16	60	10		-
12	42	+700	218	0	1265	(50)	15	85	37		-
13	39	+400	222	+60	1025	(60)	14	75	70		-
14	38	+300	115	-157	708	(70)	13	55	102		-
15	37	+200	98	-183	582	(80)	12	50	53		7.6
16	31	-120	75	-217	228	(90)	11	20	0		1.5
17	29	-180	99	-181	204	127	10	20	37		-
18	34	-30	84	-203	332	197	8	40	17		-
19	37	+200	177	-65	700	300	6.4	110	147		-
20	38	+300	103	-175	690	325	6.1	115	141		-
21	37	+200	117	-155	610	265	7	85	73		-
22	35	0	90	-195	375	237	7.5	50	0		5.5
23	32	-90	65	-247	228	271	6.8	35	25		1.4
24	32	-90	141	-118	357	520	4.5	80	72		10.0
25	27	-240	157	-95	230	675	3.6	65	22		0.1
26	23	-360	71	-223	0	733	3.4	0	140		0.9
27	25	-300	66	-232	33	623	3.9	10	43		3.4
28	27	-240	76	-217	108	524	4.5	25	73		0.4
29	28	-210	117	-155	200	670	3.7	55	93		0.9
30	29	-180	82	-207	178	833	3.1	55	54		0.1
31	34	-30	52	-252	283	1021	2.7	105	70		-
JUNE											
1	39	+400	106	-173	792	992	2.7	290	190		-
2	42	+700	260	+1200	2465	1068	2.6	950	1050		-
3	41	+600	280	+1800	2965	1093	2.5	1180	963		-
4	33	-60	257	+1110	1615	1126	2.45	660	555		-
5	24	-330	143	-115	120	1263	2.2	55	217		-
6	23	-360	69	-227	0	1403	2	0	90		-

Appendix

Date JUNE	Maximum Temperatures	Corr	Run of Wind	Corr	Corrections +565	Previous Release	Spore Factor	Estimate	Actual		Rain mm
7	27	-240	60	-240	85	2472	1.2	70	27		-
8	28	-210	132	-130	225	3458	0.87	260	374		8.1
9	27	-240	192	-40	285	4280	0.72	395	183		0.3
10	26	-270	218	-5	290	3114	0.97	300	288		29.5
11	26	-270	91	-193	102	2432	1.2	85	89		-
12	29	-180	90	-195	190	2953	1.04	185	258		-
13	33	-60	112	-160	345	4073	0.75	460	1028		3.9
14	29	-180	209	-17	368	4722	0.65	565	428		14.8
15	24	-330	117	-155	80	5199	0.6	135	154		0.3
16	28	-210	135	-127	228	5002	0.62	370	804		0.6
17	30	-150	115	-157	258	5106	0.6	430	825		-
18	30	-150	183	-55	360	6250	0.5	720	1596		30.1
19	31	-120	102	-177	268	6742	0.46	580	448		10.5
20	32	-90	156	-96	379	6926	0.45	840	363		0.2
21	32	-90	189	-47	428	6791	0.46	930	1018		-
22	34	-30	89	-197	338	7446	0.43	785	1119		-
23	37	+200	84	-205	560	and	0.43	1300	939		-
24	41	+600	104	-174	991	higher	0.43	2300	2344		-
25	40	+500	161	-88	977	values	0.43	2270	1250		0.7
26	35	0	124	-145	420	there-	0.43	975	679		1.3
27	33	-60	120	-150	355	after	0.43	825	576		2.7
28	33	-60	128	-137	368		0.43	855	1252		0.5
29	34	-30	119	-152	383		0.43	890	1100		-
30	36	+100	55	-245	420		0.43	975	1564		-